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ABSTRACT

The Magazine and Journal Instructional Kit, Part 1 (MAJAK/1) is a HyperCard introduction to: (1) periodical indexes; (2) procedures for using the University of Maryland, College Park (UMCP), Serials List to locate specific articles; and (3) the arrangement of periodicals in the seven libraries of the UMCP Libraries System. Designed, developed, formatively evaluated, and revised according to an instructional systems design model, the program provides basic, individualized instruction for students to master prior to more advanced classroom instruction in strategies and methods of library research. The need for the program, specification of its target audience, and overall content of instruction were established by the 1988 UMCP Library Education Committee. Instructional materials and activities were developed by a design team composed of a content specialist, an instructional designer, and a computer programmer. Evaluation activities and materials were administered to 28 UMCP upperclassmen in two junior composition classes. Analyses of pre- and posttest data suggested that students profited from use of the program. Analysis of observational data indicated that students had virtually no difficulty with content, encountered some problems with navigation, and found the package useful and attractive. Students' suggestions for improvement provided a rationale for incorporating a navigational tutorial and other minor revisions into the package to make it even more valuable. Copies of the pre- and posttests and the observation protocol are among the 15 exhibits attached to the report. (11 references) (Author/DB)

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MAJIK/1: HYPERCARD INTRODUCTION TO THE USE OF PERIODICALS
UNIVERSITY OF MARYLAND LIBRARIES SYSTEM
UNIVERSITY OF MARYLAND, COLLEGE PARK

ED323964

Final Report to the Council on Library Resources
Cooperative Research Grant Program
CLR 4048-F

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June 1990

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"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ABSTRACT

MAJIK/1 is a HyperCard introduction to periodical indexes; to the procedures for using the University of Maryland, College Park (UMCP), Serials List to locate specific articles; and to the arrangement of periodicals in the seven libraries of the UMCP Libraries System. Designed, developed, formatively evaluated, and revised according to an instructional systems design model, the program provides basic, individualized instruction for students to master prior to more advanced classroom instruction in strategies and methods of library research. The need for the program, specification of its target audience, and overall content of instruction were established by the 1988 UMCP Library Education Committee. Instructional materials and activities were developed by a design team composed of a content specialist, an instructional designer, and a computer programmer. Evaluation activities and materials were administered to 28 UMCP upperclassmen in two junior composition classes. Analysis of pre- and posttest data suggested that students profited from use of the program. Analysis of observational data indicated that students had virtually no difficulty with content, encountered some problems with navigation, and found the package useful and attractive. Students' suggestions for improvement provided a rationale for incorporating a navigational tutorial and other minor revisions into the package to make it even more valuable. An article describing the project and its results has been accepted for publication by College & Research Libraries.

Every day, an average of 10,000 patrons uses the seven libraries of the University of Maryland College Park (UMCP) Libraries System, asking an average of 1,200 reference questions. Many of these questions, especially in the Hornbake Library's undergraduate facilities, come from upperclassmen and are focused on finding periodical articles and then locating the appropriate periodicals within the UMCP Libraries System. Despite a one-hour library instruction session included in most freshman composition courses, it is thus evident that many transfer students and other upperclassmen have not mastered the skills of identifying and locating articles--skills that are required to complete library research assignments.

MAJIK/1--Magazine And Journal Instructional Kit, Part 1--was developed as a first step in addressing this need. The most basic of an anticipated four modules on locating periodical articles, the package is an outgrowth of the work of the 1988 Library Education Committee (chaired by Jackson and served on by Neuman) that identified the need for and general content of instruction at each of four levels of complexity. MAJIK/1--an explanation of periodical indexes in general, description of basic indexes, and instruction in locating articles within indexes and periodicals in particular UMCP libraries--provides a general overview of index use and sets the stage for instruction in the use of broader and more sophisticated periodical research materials, such as union lists and OCLC. Designed both to be used in conjunction with UMCP junior composition courses and to stand on its own as a self-paced module for individuals seeking to review and update their skills, MAJIK/1 will be housed both in the microcomputer lab in the English Department and in the projected microcomputer facilities of the Hornbake Undergraduate Library. It will be publicized with handouts and referrals at the Hornbake Library's Information Desk.

The creation of MAJIK/1 followed an eight-step process based on the principles and procedures of instructional systems design as explicated by Gagne and Briggs (1979), Dick and Carey (1985), Kemp (1985), and others. The first six steps--needs analysis, learner analysis,

specification of goals and objectives, development of test items, selection of the delivery medium, and development of materials and activities--comprised the design phase. The final two steps--formative evaluation and revision--comprised the evaluation phase. Exhibit 1, Budget Report, displays the final accounting for the funding received from the Council on Library Resources Cooperative Research Grant Program to conduct the project.

DESIGN OF MAJIK/1

Step 1: Needs Analysis

Both general and specific needs were identified through the work of the Library Education Committee during the spring and summer of 1988. Members of this Committee included the UMCP Libraries Coordinator for Instructional Services, a faculty member of the College of Library and Information Services who teaches instructional systems design, two UMCP librarians who teach in the Library Instruction Program, and a faculty member of the UMCP English Department representing junior composition teachers whose courses include a session on library instruction.

The Committee was charged originally with improving the junior component of the UMCP Library Instruction Program, which has been plagued by students' inability to profit from instruction in the advanced concepts included in this curriculum. Because many of these students have not mastered the basic concepts covered in the freshman component, junior instructors have been forced to spend time covering the basics and left unable to address such higher-level concepts as formulating successful search strategies.

Early in the development process, the Committee focused on analyzing and improving the freshman component, considering that effective instruction at this level was prerequisite to effective instruction for juniors. The Committee soon recognized, however, that the instructional problem to be addressed did not necessarily involve the freshman program itself. Instead, the failure of many juniors to be ready for more advanced instruction seemed to stem

in large part from other causes. Because transfer students and students who place out of the freshman composition requirement do not necessarily encounter the basic concepts covered in the freshman component and because other students do not necessarily use those concepts until two years after instruction, many juniors' lack of appropriate background is clearly extraneous to the quality of the freshman component. Through the Committee's deliberations, it became evident that the primary need was not the revision of the freshman program but the development of an intermediate instructional experience for students who, for whatever reasons, needed basic instruction before advanced instruction was possible.

Step 2: Learner Analysis

Committee deliberations also revealed the characteristics of the target audience for whom the instruction would be designed: juniors taking the UMCP's required upper-level composition course, which includes a requirement for a paper involving library research. The audience would be primarily transfer students, students who had placed out of the required freshman composition course, and students who wanted to refresh the skills they had been taught in that course. This wide range of students for whom the materials might be assigned precluded any finer delineation of learner characteristics and suggested that the materials had to be developed at a very basic level to make them accessible to a broad audience.

Step 3: Specification of Goals and Objectives

Committee members with experience with the upper-level course analyzed the results of students' assignments and tests and drew upon their instructional experiences to identify the concepts students should master before more advanced instruction can begin. Extensive Committee discussions thus provided the raw data for this third phase of the project, which was the first to be accomplished under the CLR grant. Exhibit 2, "Objectives for HyperCard Project," displays the four categories of goals and objectives determined by the principal investigators in this phase. This list provided the basis for developing both the instructional and the evaluation materials for the project.

Step 4: Development of Test Items

Test items based on the list of goals and objectives were devised prior to the formative evaluation of the materials. Exhibits 3 and 4, "MAJIK/1 Formative Evaluation Pretest" and "MAJIK/1 Formative Evaluation Posttest," display the format in which the test items were presented to students in an attempt to determine whether learning had occurred as a result of exposure to MAJIK/1.

The purpose of a formative evaluation is to gain information to guide the revision of a newly developed instructional package. Because a formal analysis of learning gain is not essential to achieving this purpose, it had not been proposed as part of the original grant application. Nevertheless, as the project proceeded, the principal investigators concluded that conducting such an analysis might provide additional information upon which to base the revision of the materials. The design and implementation of a simple pre- and posttest strategy was therefore added to the proposed scope of work. As is common in the design of such a strategy, the posttest is a simple reorganization of the questions presented in the pretest.

Step 5: Selection of the Delivery Medium

Several considerations merged to suggest Apple's HyperCard as the most appropriate delivery medium for MAJIK/1. Because not all students need this elementary instruction, the Committee decided that an independent, stand-alone instructional module would provide the best solution to the identified instructional problem. Students would be required to complete this module outside of the limited class time available for library instruction, which could then be devoted to the advanced instruction the junior program is designed to deliver. Both the content of the module and its implementation format could thus alleviate the problems faced by library instruction staff charged with providing instruction in research methods and strategies but prevented from addressing these concepts by the lack of appropriate background possessed by the students they encounter in class.

Although several independent learning formats were considered, ultimately Apple's HyperCard was selected for several reasons. First, HyperCard incorporates the advantages of traditional computer-assisted instruction (CAI) for independent learning: individualization, self-pacing, immediate feedback, and flexibility in scheduling. Second, HyperCard expands upon the individualization inherent in CAI by offering rapid, flexible movement through information according to each individual's preferences and needs. Third, the UMCP Libraries System had recently purchased for Hornbake Library--the library most frequently used by the target students--hardware capable of running HyperCard programs and was eager to obtain appropriate software for the machines. Finally, the desire to explore the possibilities of this exciting new format as they relate to library instruction offered a particularly appealing development challenge. In sum, the needs identified in the earliest stage of the project merged with a variety of additional factors, both theoretical and practical, to govern the selection of the medium.

Step 6: Development of Materials and Activities

The bulk of activity during the grant period involved the development of the MAJIK/1 materials themselves. These materials are arranged in the four major components outlined in the list of goals and objectives described above: "Introduction to Periodical Indexes," "Using Periodical Indexes," "Using the UMCP Serials List," and "UMCP Libraries." Each component includes the presentation of the appropriate content and instructions for navigating in a HyperCard environment; each of the two middle components, which carry the major portion of the instruction, includes a series of exercises designed to enable students to practice using the concepts presented.

The package takes advantage of the HyperCard environment through a structure that allows students flexibility of movement within and across components: within components, students may move freely among the definitions and explanations according to their individual needs for information. Across components, students may choose to go through one, two,

three, or all four segments of the package and may go through them in any order they prefer.

Development of the materials involved the close collaboration of the three individuals who comprised the instructional design team: Jackson, who provided subject matter expertise as well as experience in library instruction and who was responsible for writing the content of the package; Neuman, who provided instructional design expertise and experience in designing computer-based instruction and who was responsible for editing the content and structuring it for presentation in an electronic instructional format; and Rebekah Zanditon, the consultant funded through the grant itself, who was responsible for programming the materials and whose experience as a student in the M.L.S. program in the UMCP College of Library and Information Services enabled her to bring content knowledge as well as programming expertise to her role.

The development followed the iterative process typical of instructional systems design projects: content for each component was written, reviewed, revised, programmed, reviewed, and revised again. Over the course of the effort, approximately 230 HyperCard screens were created: 80 containing primary instructional information and 150 containing definitions, answers, and similar supplementary material. Exhibits 5 through 10, "Exemplary MAJIK/1 Screens," display the format and content of representative screens. A number of mechanisms were incorporated into the program to enable the students to navigate through the material in a flexible manner. Boldface terms and phrases provide the mechanism by which users can move to definitions of key concepts. Buttons provide the mechanism by which users can self-check their answers to the questions in the practice exercises. The icon of the "1" is the mechanism by which users can return to the beginning of the program, while the icon of the question mark provides the package's "help" mechanism. At almost any point in MAJIK/1, students may leave one part of the program to go to another simply by clicking on an icon designed specifically to represent the destination.

EVALUATION OF MAJIK/1

Step 7: Formative Evaluation

The materials themselves were completed by early June in anticipation of a formative evaluation to be conducted during the two summer sessions offered by UMCP. Human subjects clearance was obtained (see Exhibit 11) and instructors in the English Department were contacted in order to identify individual classes that would be involved in the evaluation effort. Three such classes were identified--one to be taught in the first session and two to be taught in the second. The Information Processing Laboratory of the College of Library and Information Services (CLIS) was selected as the evaluation site, and MAJIK/1 was installed on two Macintosh SE's there so that students could come individually or in pairs for the observation phase.

The class taught in the first summer session was viewed as a pilot for the evaluation processes and instrumentation, and the minimal amount of data collected in that effort was not analyzed. Logistical and other difficulties were resolved during this first session so that the full evaluation effort was ready to begin in July, as specified in the grant proposal.

Materials developed for the formative evaluation include the pre- and posttests described above, a "How to Work MAJIK" sheet (Exhibit 12), and an Observation Protocol (Exhibit 13). Sandy Dwiggins, a CLIS Ph.D. student, was identified as the graduate assistant to be funded through the project and trained in the strategy that constituted the core of the data collection effort. This strategy--interactive observations of users of the materials--was derived from tenets and procedures of naturalistic inquiry as described by Guba (1979, 1987), Lincoln and Guba (1985), and Neuman (1989).

Data Collection

Dwiggins, Jackson, and Neuman met with the students in both classes--explaining the project, requesting the students' participation, and administering the pretest. Students used

the materials between July 28 and August 3 while Dwiggins observed their efforts and questioned them about their perceptions and behaviors. As the final step in the evaluation process, students took the posttest during their regularly scheduled classes on August 8.

Students participated in the interactive observations in the Information Processing Lab of the College of Library and Information Services (CLIS). Special arrangements were made to allow access of the students to this site, which is reserved for the use of CLIS students. An observation schedule was established to ensure Dwiggins' presence while students used the MAJIK/1 materials. Dwiggins interacted freely with the students during the observations--interrupting their progress to ask them about problems they were encountering, questioning them when they finished individual sections of the program, and interviewing them upon completion of the entire experience in order to gain their insights about strengths, weaknesses, and necessary and desirable improvements.

Data Analysis

Data analysis proceeded along two fronts: statistical treatment of the pre- and posttest scores and naturalistic assessment of the observational data. The combination of both approaches was chosen in order to amass the greatest amount of information to guide the revision of the materials.

Students and context. Twenty-eight students (17 male, 11 female) from two UMCP junior composition courses participated in the evaluation effort. At least half the participants had had previous experience with a Macintosh: nine described themselves as Macintosh users, while five said they were novices at using the Mac. Eight students reported no familiarity with the hardware and six did not provide this information.

Time devoted to the program ranged from extremes of 19 to 50 minutes with a modal time of 35 minutes spent by nine of the students; half the participants completed the program in 32 to 38 minutes. There is no clear temporal pattern distinguishing those who were familiar with the Macintosh from those who were not: students at both extremes were self-

described Mac users, while those in the middle range included users, novices, non-users, and students for whom there is no data.

While the 32- to 38-minute range suggests a broad estimate of the time required to complete the program, this figure is itself inflated: it reflects time spent responding to questions interposed by the observer as well as time spent working on the program itself. Indeed, even the extremes are likely to be artifacts of the research setting, reflecting one student's extreme facility with the tool and the other's interest in exploring the design of the program itself.

Analysis of learning gain. Because the evaluation was designed to glean information to guide the revision of the program rather than to establish the effectiveness of the materials, no rigorous statistical procedures were followed. The students involved in the process were not chosen randomly, for example, and no control group was involved in the pre- and posttesting. Nevertheless, in an attempt to draw some general inferences about the instructional effectiveness of MAJIK/1, Dwiggins and Neuman used the microcomputer version of SPSS to analyze basic differences between pre- and posttest scores for the 24 students for whom such data was available.

This analysis revealed a notable increase in student performance between the pre- and the posttest. Scores on the pretest ranged from 31 to 80 percent correct, while those on the posttest ranged from 55 to 83 percent. The mean score increased from 59.2 percent correct on the pretest to 68.4 percent correct on the posttest--an increase of approximately 15%. While these figures cannot be taken as proof of the program's effectiveness, they at least suggest that MAJIK/1 has promising instructional value.

Analysis of observational data. The Observation Protocol was designed to structure both the collection and the analysis of data according to the four major segments of the MAJIK/1 materials described above. In addition, the observations themselves revealed another dimension to be addressed: the learning and use of the features specific to HyperCard that allow users

to navigate HyperCard materials with flexibility and ease.

Because of the small number of students observed using MAJIK/1 (28), manual rather than electronic means were used to analyze the data. Preliminary data analysis consisted of creating matrices that displayed the data for each student according to each of the categories in the Observation Protocol (see Exhibit 14). Final analysis involved summarizing this information by category (including the new "HyperCard" category revealed during the observations); compiling students' summary comments; and drawing the conclusions and implications reported below.

1. Introduction to HyperCard Features. The observations revealed that students had more difficulty mastering the procedures required to navigate MAJIK/1 than they had mastering its content. While this finding is not surprising, given the novelty of the format for many of the student participants, it suggests an area of concern both for MAJIK/1's designers and for the designers of similar materials. In order to accommodate student groups who will undoubtedly include learners who are unfamiliar with the terminology, conceptual structure, and navigational possibilities inherent in HyperCard, it is clear that designers of HyperCard packages must incorporate features that will enable such students to use the packages independently.

Throughout their use of the program, students' problems navigating HyperCard were basic. Initially, for example, several students were unfamiliar with the notions of "clicking," "buttons," and "icons" and had to be instructed by the observer in these ideas and in their relationship. A quarter of the students expressed dismay about the amount of navigational material--particularly icons--they were expected to know in order to use the program: "We're supposed to remember all these?" A number of students also failed to remember that clicking on a boldface item would lead to its definition, and several made navigational errors that can be attributed to their lack of understanding of how to move through HyperCard material: "How do you get back to the question mark [i.e., the help] section?"

2. Introduction to Periodical Indexes. Students had virtually no problems with the content presented in this brief component, which defines periodical indexes; differentiates between general and specialized indexes; and explains the various formats (print, microform, and electronic) in which indexes are published. Some of the navigational problems described above, however, began to appear in this segment of the package.

Several students chose to skip this section entirely, but most proceeded through it (and the rest of the program) in an essentially linear manner. While the straightforward nature of this segment suggests that linear progression is the most appropriate approach here, consideration of how the segment and the package as a whole might take better advantage of the flexibility inherent in HyperCard is probably warranted.

3. Using Periodical Indexes. Students' use of this most extensive component of MAJIK/1 revealed few difficulties with content but a number with navigation. Although the content here is the most complex in the package--choosing appropriate indexes; identifying the elements of citations; and using headings, subheadings, and cross references--students seemed to understand it readily. The fact that a number of students reported that they had known the content beforehand, however, means that the question of its clarity to all members of the eventual target audience (i.e., students for whom the materials will be an introduction rather than a review) was not adequately answered during the evaluation.

Students seemed especially pleased with the practice exercises introduced in this segment, giving evidence of active engagement (e.g., nodding their heads as they proceeded) and offering such positive comments as "good," "helpful," and "There were enough exercises to make you feel comfortable with the material." The number and tenor of students' comments on the exercises suggest that they are a useful and attractive feature.

Several students found the directions for completing the exercises unclear. The primary source of students' confusion seemed to be the design of the exercises rather than the directions themselves. As illustrated in Exhibit 7, the exercises are a series of multiple-choice

questions with lettered options and with an instruction to answer each question mentally and then click on a button to confirm the correctness of the answer. Almost half the students, however, initially tried to enter the letters of their choices--expecting the program to accept and judge their responses in the now-familiar format of comparable computer-assisted instruction tasks. Apparently because the MAJIK/1 format ran counter to their expectations, these students were initially disconcerted by it. Students overcame their confusion readily, however, suggesting that the problem is a minor one.

Most students proceeded through this segment in a linear fashion, although a number traversed the material more flexibly. Of these, six discovered the strategy of using the table of contents as a focal point and employed this approach successfully. A number of students forgot the option of using boldface to move to definitions, while several failed to realize that clicking on a boldface italic term or phrase (i.e., the title of an index) would lead them to an explanation of its nature and use.

4. Using the UMCP Serials List. Students' perceptions and behaviors related to this component paralleled their experiences with the previous one. Students encountered few problems with the content, which includes an explanation of the microfiche reader and instructions on how to select and use the microfiche cards that comprise the UMCP Serials List to locate periodicals stored in various formats in the UMCP Libraries (i.e., microform, bound volumes, current stacks). Students used the practice exercises extensively and actively and made few suggestions about improving this segment of MAJIK/1. Almost all students reverted to a strictly linear navigational strategy here, a situation that seems to reflect the nature of the content presented in this component.

5. UMCP Libraries. This segment--a simple listing of the UMCP Libraries and the way each houses its periodicals--presented neither conceptual nor navigational difficulties for students. The nature of the information included in this component suggests that the capability for getting screen prints would be a useful addition to the program here, as it

might be for other segments as well. Several students failed to realize they had finished the program, suggesting that the revision of the end card here would also be helpful.

6. Summary Comments. Upon completion of the program, students were asked to summarize their MAJIK/1 experience, and almost all their summary comments were positive. Students focused on such features as the program's good graphics (13 comments), clear text (10), helpful practice exercises (9), self-pacing (7), and ease of movement within the package (5). Selected comments in each of these categories are displayed in Exhibit 15. Students' general comments focused on the informative, useful, easy-to-use, and creative nature of the materials, with one student commenting on the good balance between text and graphics and another pronouncing the program "very worthwhile." One student noted that "[I] learned as much from the module as I had in class."

Nine students in the group explained that the materials had been a review for them, while the others did not offer that information. Several suggested that the package would be good for freshmen, sophomores, and transfer students: one recommended that it be compulsory for freshmen and another wished it had been available "when I was a freshman."

Not all summary comments were positive, of course: five students criticized the amount of detail in the program, five complained that the icons were difficult to remember, three protested the amount of time it took them to complete the package, and two noted the confusion they had experienced over the use of boldface. As one critic noted, "The only reason a person would go through all this would be if the professor made them."

Step 8: Revision of MAJIK/1

Both statistical and naturalistic analyses of student performance suggested that the package as originally designed effectively met the needs it set out to address. In particular, students' comments and observed behaviors indicated that the materials were attractive, useful, and reinforcing. Having achieved a measure of success even in its initial trial, MAJIK/1 as revised should be even more helpful and worthwhile.

The revision process involved analyzing the data for suggestions for revision and incorporating those suggestions that would most enhance the final product. Most of the revisions addressed general and specific devices that will enable all students--even those unfamiliar with HyperCard--to proceed through the materials independently. For example, the icons were examined to determine whether they could be made more representative. Labels were added to the icons to enhance their visual stimulus with a verbal one. Hints and prompts about the meanings and uses of the various navigational features were incorporated directly into appropriate screens to serve as reminders throughout the package.

Most importantly, an optional tutorial explaining the features of the program and suggesting navigational strategies was included at the beginning of the package to provide the support students clearly need. The tutorial includes not only instruction in the meanings and uses of navigational features but both graphic and verbal information that should enhance students' abilities to proceed independently. An overview of the entire package as well as an overview of its most complex component should help students develop an appropriate conceptual structure to guide their progress through the materials. Instructions in using the table of contents as a focal point, or pivot, should give students a way to orient themselves by choosing individual segments and returning regularly to a recognized "home base."

CONCLUSION

The design, development, evaluation, and revision of MAJIK/1 have resulted in several products of use to library instructors. Most obviously, of course, is the program itself, which can be used in the UMCP Libraries System to address the instructional needs of many transfer and other upperclass students who must master basic concepts before they can profit from advanced instruction in library research skills. Secondly, publications and presentations related to the product as well as to its development process will convey the knowledge and expertise developed through this project to faculty and staff beyond the UMCP campus who

are exploring the application of computer assisted instruction, and particularly HyperCard instruction, to basic library education. And third, the combination of an instructional systems design (ISD) approach to create the materials with the use of naturalistic inquiry (NI) techniques to evaluate them has provided the basis for a development model that is not only new to library education but whose use is in its infancy in other fields as well.

It is this ISD/NI model that is potentially the most significant result of the MAJIK/1 project. Combining the advantages of insights from two separate academic disciplines, the model provides guidance for the entire development cycle for library education materials. Following this systematic and straightforward approach can result in materials that effectively meet the needs of the students for whom they are designed.

In the design phase for MAJIK/1, the use of ISD techniques resulted in well-grounded analyses of instructional needs and learner characteristics, in the precise specification of relevant goals and objectives, in the writing of test items directly related to those goals and objectives, in the selection of the delivery format that was most appropriate for both the content of the instruction and the needs of the target audience, and in the thoughtful development of materials and activities designed to address the goals and objectives for the identified learners. Moreover, the "team" approach common to ISD efforts led to the collaboration of experts in three areas--library education, instructional message design, and HyperCard programming--to ensure that all appropriate areas of expertise were tapped as the materials were designed. The iterative process characteristic of the ISD approach guaranteed that all three developers would review and comment upon one another's efforts, ensuring that the prototype product reflected the best insights of the group as a whole.

Formative evaluation and prototype revision are inherent in the ISD approach, but employing NI techniques during evaluation in order to get optimal information for revision is a relatively new strategy. Several authors have suggested an ISD approach to designing bibliographic instruction (for example, Cottam & Dowell, 1981; Jacobson & Albright, 1983;

Kenny & McArthur, 1984; Miller & Bratton, 1988); but none has sought to combine that approach with an NI-based evaluation. Drawing upon the assumptions and techniques of NI in this project, however, brought important strengths to the MAJIK/1 materials. Of obvious value are the insights related to specific revisions gleaned through the interactive observations of participating students. Even more significant, however, is the discovery through this technique of the major deficiency in the program--i.e., the lack of adequate support for students to draw upon to navigate the HyperCard materials successfully. Thus, while the more traditional pretest-posttest approach yielded little information for revision (and none on this important topic), NI provided insight into the revisions that are most likely to enhance the quality and utility of the materials.

The hallmark of NI is its underlying assumption that the individuals in a research study are "participants" with valuable insights to offer rather than "subjects" to be tested according to the researcher's own preconceptions and beliefs. The NI strategies used in this study capitalized on this assumption, ensuring that individuals like those for whom the materials were designed had ample opportunity to react to the materials, to identify effective and ineffective instructional approaches within them, and to suggest ways to improve the product. Clearly, incorporating the information gained through this approach into the revision of MAJIK/1 should result in a product that is even more effective.

The creation of MAJIK/1 thus provided a test case for the combination of the techniques of ISD and of NI into a new model for developing and testing an interactive instructional package for basic library education. While the resulting product is by no means perfect and while difficulties in implementing this combination of techniques remain, the MAJIK/1 experience suggests that the basic model itself offers a feasible approach to similar development projects. And because this project has served as a preliminary validation of the model, it can be used in similar projects with some confidence that the resulting materials will be effective with and attractive to the audiences for whom they are designed.

EXHIBIT 1

BUDGET REPORT

COMPUTER DATE 05/03/90
TIME OF DAY 01 07 51
PGM=AMOSO-C1 VERSION : MR.01 03

UNIVERSITY OF MARYLAND ACCOUNTING SYSTEM REPORT
ACCOUNT STATEMENT IN WHOLE DOLLARS FOR 04/30/90
FCPO CLR4048-F

REPORT PAGE 8858
USER ID 30.2
ACCOUNT PAGE 1

ACCT 01-4-33458
DEPT 8101

TO: NEUMAN, D.

TF	TR	C/G	SA	PUR	PI-NO	SPON	SP-NO	FED/ST-ID-NO	ON-RT1	ON-RT2	START	END	TECH-RPT	FISC-RPT	INVT-RPT	RMVL-RPT
50	40	12	10	00	0000	9000			1 0000	0 0000	11/01/88	03/31/90	00/00/00	00/00/00	00/00/00	00/00/00

SUB CODE	DESCRIPTION	BUDGETS ORIGINAL	BUDGETS REVISED	ACTUAL CURRENT MONTH	ACTUAL FISCAL YEAR	ACTUAL PROJ TO DATE	OPEN COMMITMENTS	BALANCE AVAILABLE	PERC USED
1020	GRAD ASST FELLOWS				446-				0
3000	EXPENSE POOL	2,900	2,900					2,900	0
3120	OUTSIDE CONSULTANTS				1,050	2,550		2,550-	0
3321	OUT-STATE-ROUTINE			201-	6-	6-		6	0
3916	OFFICE SUPPLIES					26		26-	0
3924	INSTRUCT MATERIALS				241	241		241-	0
4035	ACAD DP SUPPLIES					17		17-	0
	SUPPLIES & MATERIALS				241	284		284-	0
	TOTAL OPER & EQUIP	2,900	2,900	201-	1,285	2,828		72	98
	TOTAL DIRECT EXP	2,900	2,900	201-	839	2,828		72	98
	ACCOUNT TOTAL	2,900	2,900	201-	839	2,828		72	98

THIS IS A MONTH-END STATUS REPORT FOR YOUR ACCOUNT SUMMARIZING CURRENT MONTH AND YEAR-TO-DATE ACCOUNTING INFORMATION.

EXHIBIT 2

OBJECTIVES FOR HYPERCARD PROJECT

1. Introduction to periodical indexes

   The user will describe the nature and purposes of indexes.

   A. The user will define a periodical index.

   B. The user will name two different types of periodical indexes, e.g., newspaper, magazine, mixed.

   C. The user will differentiate between a general and a specialized index.

   D. The user will state the titles of three different periodical indexes.

   E. The user will state that print, microfilm, and electronic indexes are available.

2. Instruction in the use of periodical indexes

   The user will select appropriate indexes and subject headings and identify the elements of a citation in a basic general index.

   A. Given a particular topic, the user will select an appropriate general index for that topic.

   B. Given a particular topic, the user will locate appropriate subject heading(s) within an index for that topic.

   C. The user will identify all the elements in a given citation, i.e., article author, article title, periodical title, volume, date, pages.

   D. The user will match abbreviated journal titles to the full titles.

   The user will use subject headings, subheadings, citations, and cross references in index entries.

   A. Given a page from an index, the user will identify the subject heading, a subheading, a citation, and a cross reference.

   B. The user will follow a cross reference to its referent.

3. Instruction in the use of the University of Maryland, College Park, Serials List.

   The user will understand the operation of the microfiche machine.

   A. The user will turn on the microfiche machine and insert the microfiche card properly.

   The user will identify locations and holdings for any periodical within the UMCP Libraries.

   A. Given a periodical index citation, the user will identify the UMCP Serials List as the source of information to locate that article.

   B. Given a specific periodical title, the user will select the correct microfiche to be used.

   C. The user will identify and state the purpose of the index at the top of each column of the microfiche card.

   D. Given a specific periodical title, the user will use the index to locate that title on the card.

   E. Given a specific periodical title, the user will determine the call number for that title.

   F. Given a specific issue of a periodical, the user will determine which library/libraries hold that issue. The user will identify what format that issue is in, i.e., microfilm, microfiche, bound, current stacks. The user will identify the appropriate strategy for finding a periodical title not found on the Serials List, i.e., asking the Reference Desk for assistance.

4. Description of the arrangements of periodicals in the various UMCP Libraries.

   The user will determine where in the Libraries s/he can find the periodical needed.

   A. The user will explain the difference in the ways periodicals are stored in McKeldin and Hornbake Libraries.

   B. The user will identify the appropriate strategy for finding periodicals in the other UMCP Libraries, i.e., asking at each library how periodicals are stored.

EXHIBIT 3

MAJIK FORMATIVE EVALUATION
PRETEST

Name: _____

Student ID #: _____

1. What is a periodical index?
   a. A set of numbers measuring periodic activity
   b. A guide to the contents of periodicals
   c. An organized group of periodicals
   d. None of the above

2. Which of these are kinds of periodical indexes?
   a. Newspaper indexes
   b. Magazine indexes
   c. Neither of the above
   d. Both of the above

3. A general periodical index includes:
   a. Popular magazines
   b. Professional journals
   c. Both of the above
   d. Neither of the above

4. A specialized periodical index includes:
   a. Popular magazines
   b. Professional journals
   c. Both of the above
   d. Neither of the above

5-7. Name three periodical indexes.

   a. _____

   b. _____

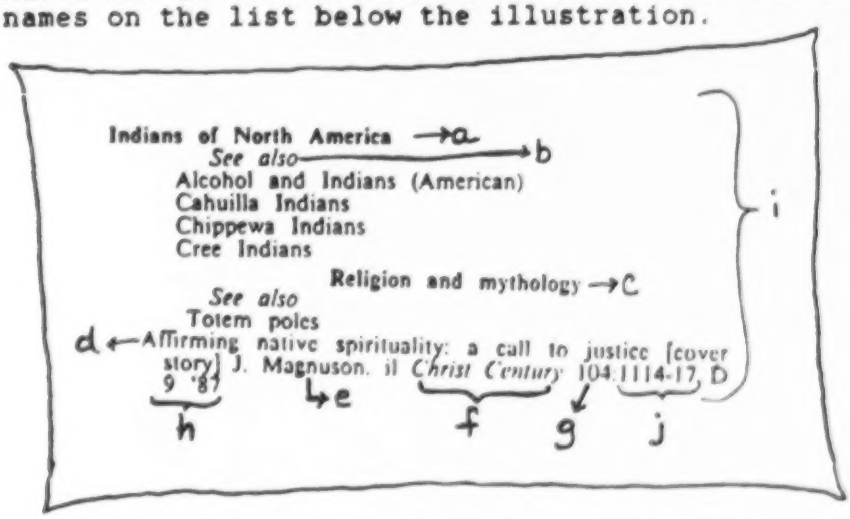
   c. _____

8. Periodical indexes are available in these forms:
   a. Print
   b. Microform
   c. Electronic
   d. All of the above

9. Which index would you use <u>first</u> to find articles on school finance?
   a. <u>Business Periodicals Index</u>
   b. <u>National Newspaper Index</u>
   c. <u>Education Index</u>
   d. <u>Magazine Index</u>

10. Which subject heading(s) would you select to find articles on the University of Maryland?
    a. Universities--private
    b. Academic achievement--secondary
    c. Sports--collegiate
    d. None of the above

11-20. Match the letters on the illustration with the correct names on the list below the illustration.



( ) citation
( ) subject heading
( ) subheading
( ) volume number
( ) date of publication
( ) author
( ) article title
( ) journal title
( ) page numbers
( ) cross reference

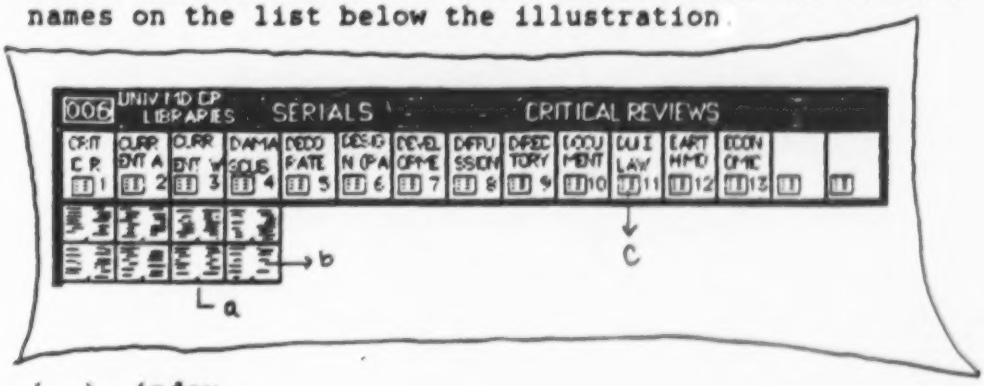
21. The word "see" in an index tells you:
    a. The index has no articles at all about this topic.
    b. The index has no articles about the topic here but has related articles under another heading.
    c. The index has articles here and under another heading.
    d. None of the above.

22. The words "see also" in an index tell you:
    a. The index has no articles at all about this topic.
    b. The index has no articles about the topic here but has related articles under another heading.
    c. The index has articles here and under another heading.
    d. None of the above.

23. What should you use to learn which UMCP library or libraries have a periodical you need?
    a. UMCP Serials List
    b. A periodical index
    c. A campus map
    d. GEAC, the campus online catalog

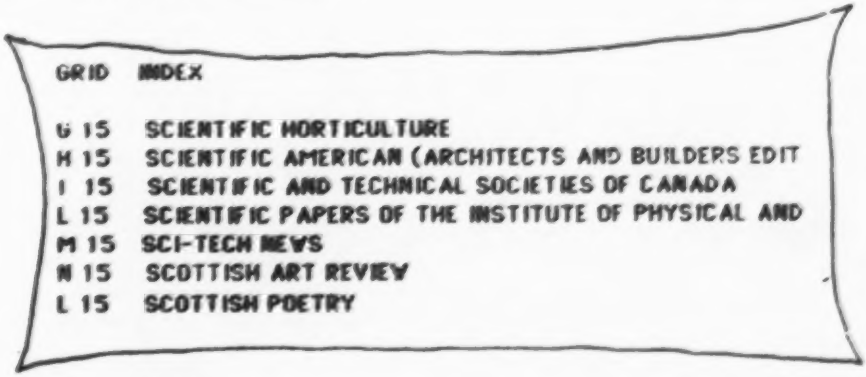
24. To find the Journal of Special Education Technology in the UMCP Libraries, you would look on a microfiche with which heading?
    a. Journal of Science Education
    b. Journal of Space Exploration
    c. Special Education Abstracts
    d. Special Education, Journal of

25-27. Match the letters on the illustration with the correct names on the list below the illustration.



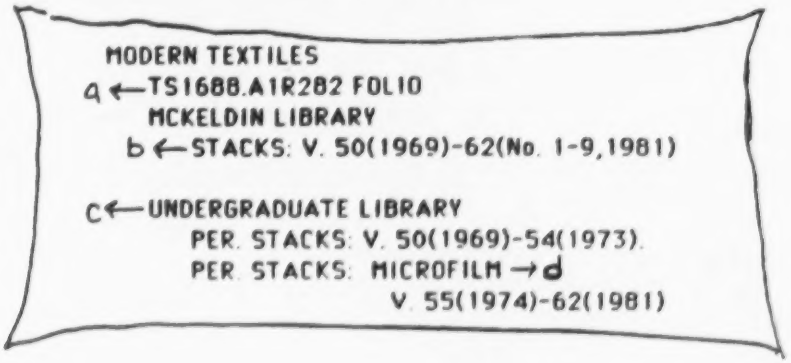
( ) index
( ) frame
( ) identifying letter

28. In which frame in the illustration below would you find the journal Scottish Poetry?


GRID INDEX
G 15 SCIENTIFIC HORTICULTURE
H 15 SCIENTIFIC AMERICAN (ARCHITECTS AND BUILDERS EDIT
I 15 SCIENTIFIC AND TECHNICAL SOCIETIES OF CANADA
L 15 SCIENTIFIC PAPERS OF THE INSTITUTE OF PHYSICAL AND
M 15 SCI-TECH NEWS
N 15 SCOTTISH ART REVIEW
L 15 SCOTTISH POETRY

a. Frame L
b. Frame 15
c. Frame L 15
d. Any of the above

29-32. Match the letters on the illustration with the correct names below the illustration.



( ) call number
( ) library where periodical can be found
( ) part of library where periodical can be found
( ) format of periodical

33. In McKeldin Library, periodicals are arranged like this:
    a. Bound volumes are in the stacks; current issues are in the Periodical Room.
    b. Both bound volumes and current issues are in the Periodical Room.
    c. Both bound volumes and current issues are in the stacks.
    d. None of the above

34. In Hornbake Library, periodicals are arranged like this:
    a. Bound volumes are in the stacks; current issues are in the Periodical Room.
    b. Both bound volumes and current issues are in the Periodical Room.
    c. Both bound volumes and current issues are in the stacks.
    d. None of the above

35. When you can't find a periodical or an article using the tools in a library, you should:
    a. Give up and go home
    b. Ask another student
    c. Complain to your teacher
    d. Ask your friendly Reference Librarian

MAJIK FORMATIVE EVALUATION
POSTTEST

Name: _____

Student ID #: _____

1. A general periodical index includes:
   a. Popular magazines
   b. Professional journals
   c. Both of the above
   d. Neither of the above

2. A specialized periodical index includes:
   a. Popular magazines
   b. Professional journals
   c. Both of the above
   d. Neither of the above

3. Which of these are kinds of periodical indexes?
   a. Newspaper indexes
   b. Magazine indexes
   c. Neither of the above
   d. Both of the above

4. What is a periodical index?
   a. A set of numbers measuring periodic activity
   b. A guide to the contents of periodicals
   c. An organized group of periodicals
   d. None of the above

5. Periodical indexes are available in these forms:
   a. Print
   b. Microform
   c. Electronic
   d. All of the above

6-8. Name three periodical indexes.

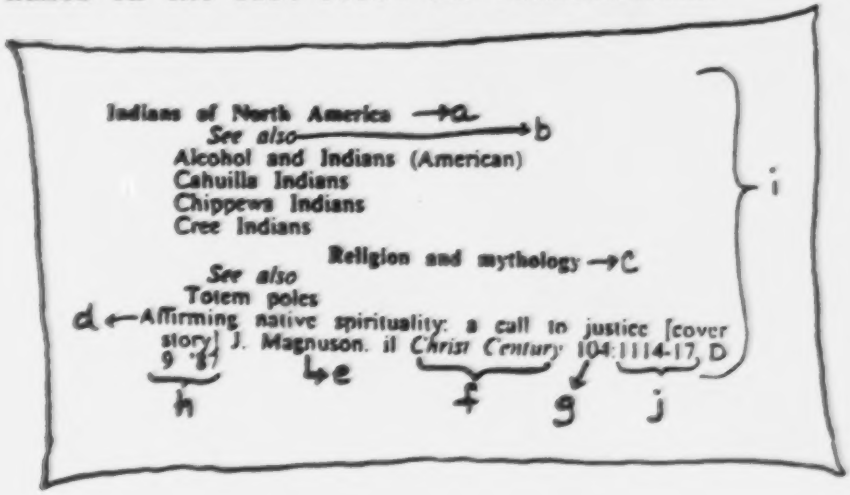
   a. _____.

   b. _____ _____

   c. _____ _____

9. Which subject heading(s) would you select to find articles on the University of Maryland?
   a. Universities--private
   b. Academic achievement--secondary
   c. Sports--collegiate
   d. None of the above

10-19. Match the letters on the illustration with the correct names on the list below the illustration.



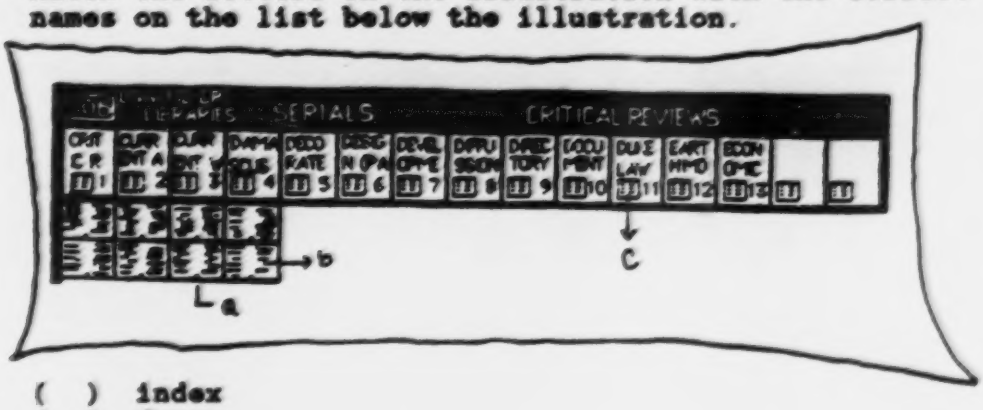
( ) citation
( ) subject heading
( ) subheading
( ) volume number
( ) date of publication
( ) author
( ) article title
( ) journal title
( ) page numbers
( ) cross reference

20. Which index would you use <u>first</u> to find articles on school finance?
   a. <u>Business Periodicals Index</u>
   b. <u>National Newspaper Index</u>
   c. <u>Education Index</u>
   d. <u>Magazine Index</u>

21. The words "see also" in an index tell you:
   a. The index has no articles at all about this topic.
   b. The index has no articles about the topic here but has related articles under another heading.
   c. The index has articles here <u>and</u> under another heading.
   d. None of the above.

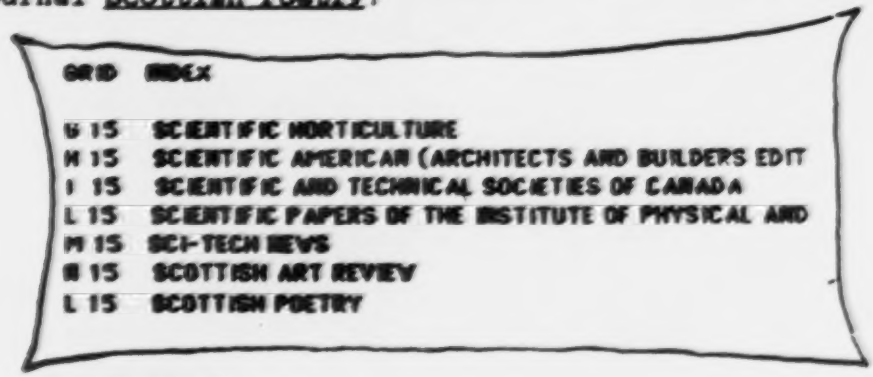
22. The word "see" in an index tells you:
    a. The index has no articles at all about this topic.
    b. The index has no articles about the topic here but has related articles under another heading.
    c. The index has articles here and under another heading.
    d. None of the above.

23-25. Match the letters on the illustration with the correct names on the list below the illustration.



( ) index
( ) frame
( ) identifying letter

26. In which frame in the illustration below would you find the journal Scottish Poetry?

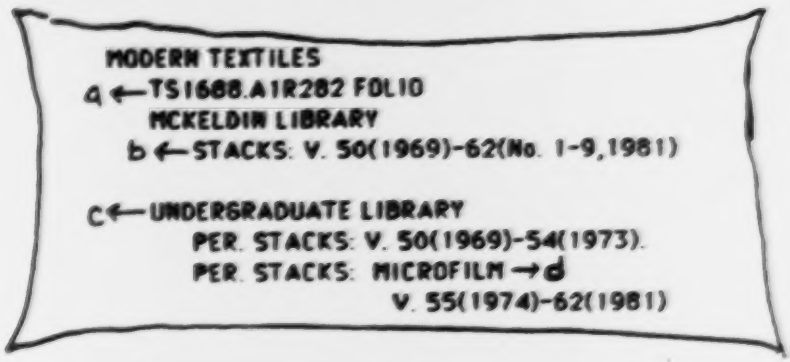

GRID INDEX
15 SCIENTIFIC HORTICULTURE
15 SCIENTIFIC AMERICAN (ARCHITECTS AND BUILDERS EDIT
15 SCIENTIFIC AND TECHNICAL SOCIETIES OF CANADA
15 SCIENTIFIC PAPERS OF THE INSTITUTE OF PHYSICAL AND
15 SCI-TECH NEWS
15 SCOTTISH ART REVIEW
15 SCOTTISH POETRY

a. Frame L
b. Frame 15
c. Frame L 15
d. Any of the above

27. To find the Journal of Special Education Technology in the UMCP Libraries, you would look on a microfiche with which heading?
    a. Journal of Science Education
    b. Journal of Space Exploration
    c. Special Education Abstracts
    d. Special Education, Journal of

28. What should you use to learn which UMCP library or libraries have a periodical you need?
    a. UMCP Serials List
    b. A periodical index
    c. A campus map
    d. GEAC, the campus online catalog

29-32. Match the letters on the illustration with the correct names below the illustration.



( ) call number
( ) library where periodical can be found
( ) part of library where periodical can be found
( ) format of periodical

33. In Hornbake Library, periodicals are arranged like this:
    a. Bound volumes are in the stacks; current issues are in the Periodical Room.
    b. Both bound volumes and current issues are in the Periodical Room.
    c. Both bound volumes and current issues are in the stacks.
    d. None of the above

34. In McKeldin Library, periodicals are arranged like this:
    a. Bound volumes are in the stacks; current issues are in the Periodical Room.
    b. Both bound volumes and current issues are in the Periodical Room.
    c. Both bound volumes and current issues are in the stacks.
    d. None of the above

35. When you can't find a periodical or an article using the tools in a library, you should:
    a. Give up and go home
    b. Ask another student
    c. Complain to your teacher
    d. Ask your friendly Reference Librarian

DW & SD/7-89

EXHIBITS 5-10

EXEMPLARY SCREENS

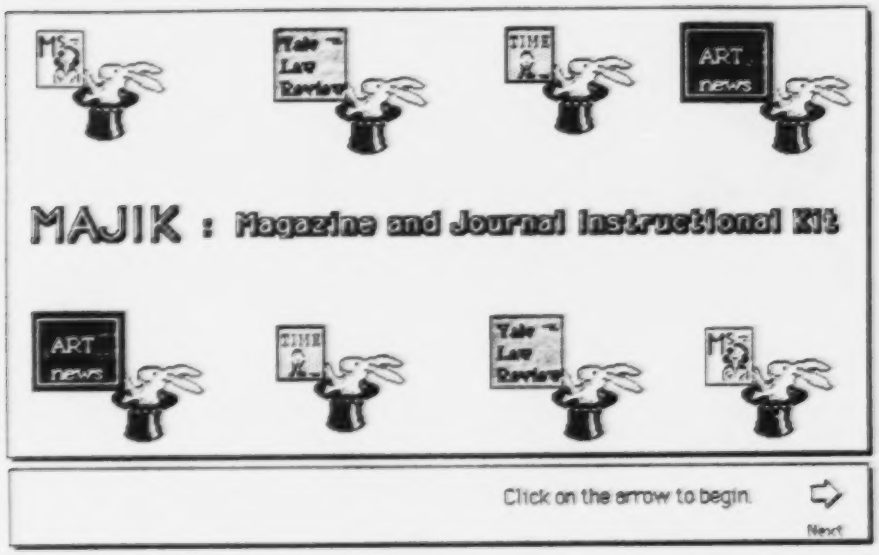


Exhibit 5

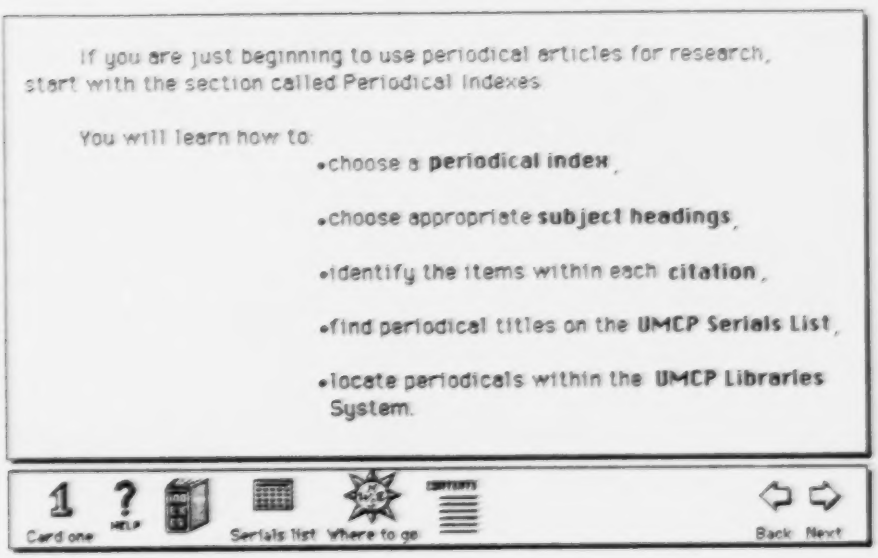

If you are just beginning to use periodical articles for research, start with the section called Periodical Indexes.
You will learn how to:
•choose a periodical index,
•choose appropriate subject headings,
•identify the items within each citation,
•find periodical titles on the UMCP Serials List,
•locate periodicals within the UMCP Libraries System.
1
Card one
HELP
Serials list
Where to go
Back
Next

Exhibit 6

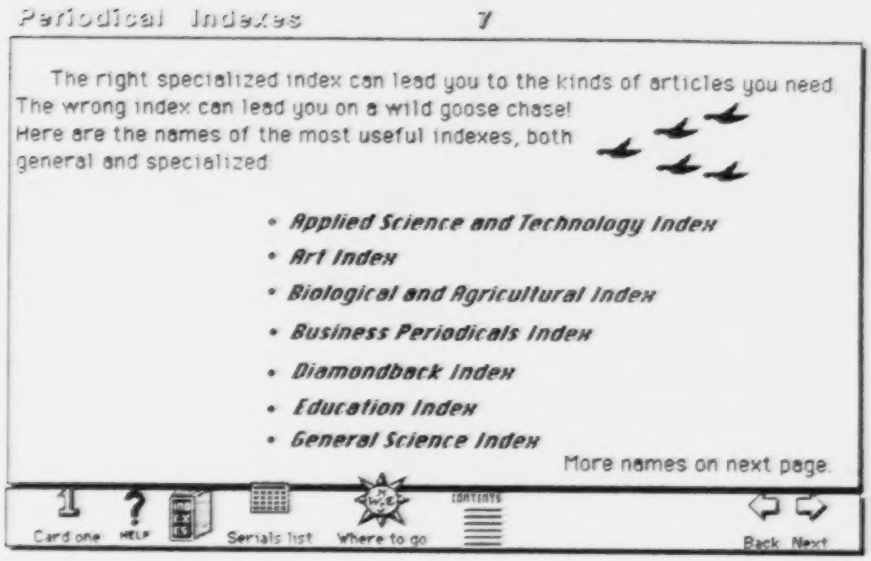

Periodical Indexes 7
The right specialized index can lead you to the kinds of articles you need. The wrong index can lead you on a wild goose chase! Here are the names of the most useful indexes, both general and specialized.
• Applied Science and Technology Index
• Art Index
• Biological and Agricultural Index
• Business Periodicals Index
• Diamondback Index
• Education Index
• General Science Index
More names on next page.
Card one
HELP
Serials list
Where to go
Back
Next

Exhibit 7

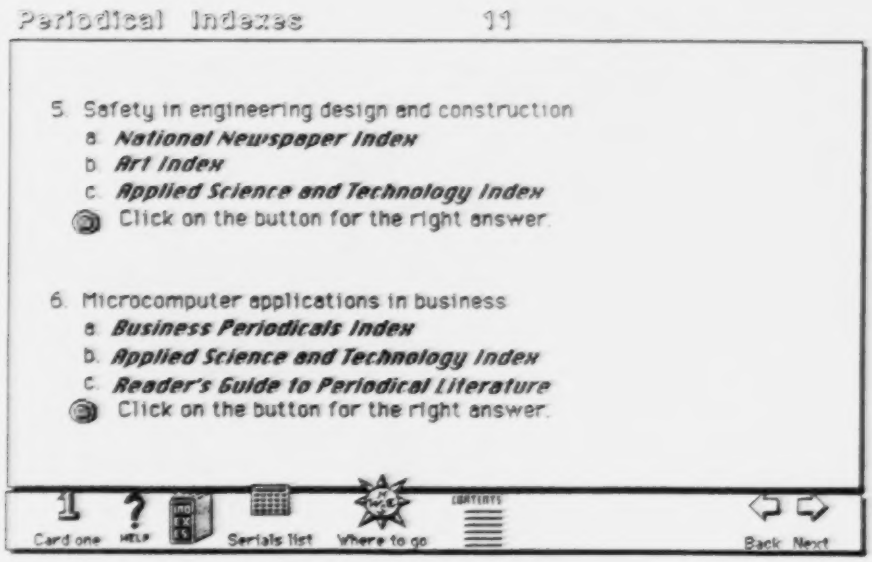

Periodical Indexes 11
5. Safety in engineering design and construction
a. National Newspaper Index
b. Art Index
c. Applied Science and Technology Index
Click on the button for the right answer.
6. Microcomputer applications in business
a. Business Periodicals Index
b. Applied Science and Technology Index
c. Reader's Guide to Periodical Literature
Click on the button for the right answer.
Card one
HELP
Serials list
Where to go
Back
Next

Exhibit 8

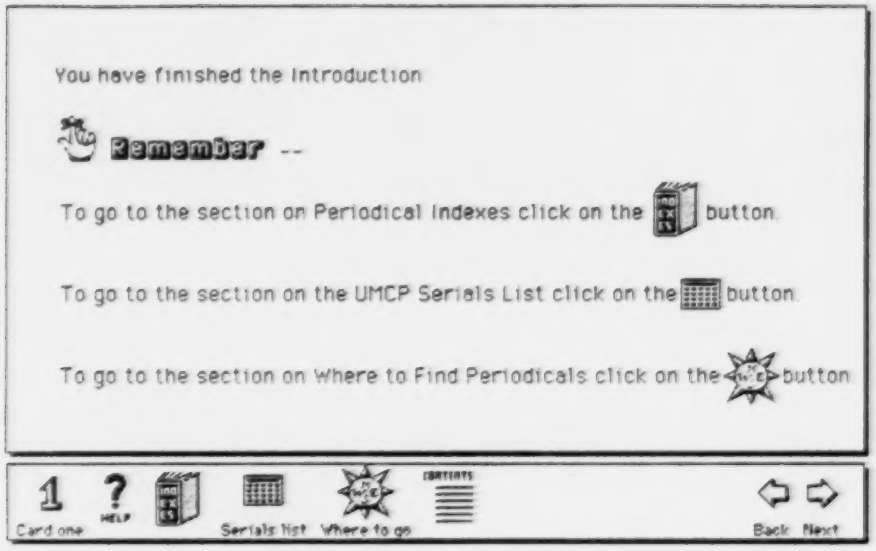

You have finished the Introduction
Remember --
To go to the section on Periodical Indexes click on the button.
To go to the section on the UMCP Serials List click on the button.
To go to the section on Where to Find Periodicals click on the button.
Card one
HELP
Serials list
Where to go
CONTENTS
Back
Next

Exhibit 9

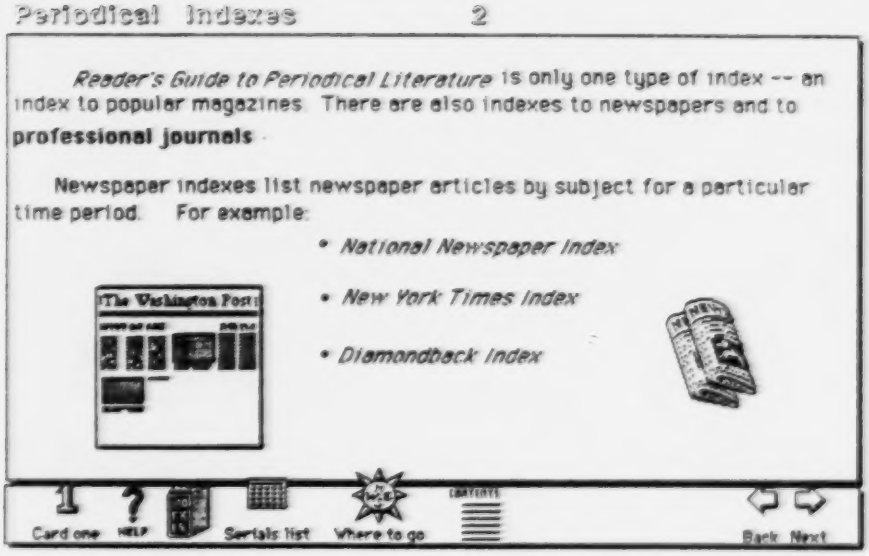

Periodical Indexes 2
Reader's Guide to Periodical Literature is only one type of index -- an index to popular magazines. There are also indexes to newspapers and to professional journals.
Newspaper indexes list newspaper articles by subject for a particular time period. For example:
• National Newspaper Index
• New York Times Index
• Diamondback Index
The Washington Post
Card one
HELP
Serials list
Where to go
CONTENTS
Back
Next

Exhibit 10

EXHIBIT 11

UNIVERSITY OF MARYLAND
College Park, MD 20742

INSTITUTIONAL REVIEW BOARD

PRINCIPAL INVESTIGATOR:
(or Faculty Advisor) Dr. M. Delia Neuman

STUDENT INVESTIGATOR:

PROJECT TITLE:
Hypertext Introduction to UMCP Serials List

The Chairman of the University IRB reviewed the above-mentioned project on 3-1-89 in accordance with Public Health Service grant policy as defined in "The Institutional Guide to DHHS Policy on Protection of Human Subjects," 12-2-71, and in Title 45, Code of Federal Regulations, Part 46, and found this project to be exempt.

Exemption No. 1

W. D. Lahin
Chairman of Institutional Review Board

The Principal Investigator and Student Investigator, in signing this report, agree to notify the Office of the Dean for Graduate Studies and Research of any addition to or changes in procedure subsequent to this review.

Delia Neuman
Principal Investigator
(or Faculty Advisor)

Student Investigator

PLEASE RETURN ONE SIGNED COPY TO THE GRADUATE SCHOOL, RM 2133, SOUTH ADMINISTRATION BUILDING

4/88
IRB-4

HOW TO WORK **MAJIK**

WHAT IS MAJIK?

MAJIK (MAGAZINE AND JOURNAL INSTRUCTIONAL KIT) IS A SELF-GUIDED INSTRUCTIONAL MODULE. IT USES A SPECIFIC KIND OF SOFTWARE PRESENTATION CALLED HYPERCARD. HYPERCARD IS SPECIAL BECAUSE IT ALLOWS YOU TO DESIGN YOUR OWN METHOD OF LEARNING. YOU DO NOT HAVE TO GO THROUGH THE INSTRUCTIONS STEP BY STEP. INSTEAD, YOU CAN MOVE TO ANOTHER PART OF THE MODULE WHENEVER YOU WISH, AND SKIP PARTS THAT YOU ALREADY KNOW. YOU CAN ALSO GO BACK TO REVIEW ANY PART YOU WISH, WHEREVER YOU ARE IN THE MODULE.

HOW DOES IT WORK?

WITH HYPERCARD, YOU CAN GO TO ANY PART OF THE MODULE YOU WANT TO SEE BY CLICKING THE MOUSE **ONCE** ON ONE OF THREE CHOICES ON THE SCREEN:

1. ICONS IN THE LOWER LEFT CORNER OF THE SCREEN
2. BOLDFACED WORDS OR PHRASES
3. ARROWS ON THE LOWER RIGHT CORNER OF THE SCREEN

EACH OF THESE CHOICES, THE ICONS, THE BOLDFACE WORDS AND PHRASES, AND THE ARROWS ARE CALLED "BUTTONS" IN HYPERCARD. USING THE BUTTONS, YOU CAN MOVE BACK AND FORTH BETWEEN SCREENS IN DIFFERENT PARTS OF THE MODULE. EACH BUTTON IS FULLY EXPLAINED AT THE BEGINNING OF THE **MAJIK** MODULE.

HOW TO START.

1. WHEN YOU SIT DOWN AT THE COMPUTER, YOU WILL SEE THE TITLE SCREEN OF **MAJIK**.

2. IN THE LOWER RIGHT CORNER OF THE SCREEN YOU WILL SEE AN ARROW POINTING TO THE RIGHT.

3. USING THE MOUSE, MOVE THE CURSOR (A SMALL HAND WITH A POINTING FINGER) DOWN TO THE ARROW. MAKE SURE THE FINGER IS POINTING TO THE ARROW.

4. CLICK THE MOUSE ONCE. YOU SHOULD SEE THE NEXT SCREEN OF THE MODULE THAT EXPLAINS THE ARROWS.

5. TO MOVE TO THE NEXT SCREEN WHICH EXPLAINS THE ICONS, DO AS YOU DID IN STEPS 3 AND 4, MOVE THE POINTING FINGER TO THE ARROW POINTING TO THE RIGHT.

6. TO GO BACK ONE SCREEN, USE THE ARROW POINTING TO THE LEFT.

7. AS YOU MOVE THROUGH THE MODULE, YOU CAN ALWAYS RETURN TO THESE EXPLANATION SCREENS WHENEVER YOU WISH. WHENEVER YOU CHOOSE A BUTTON, REMEMBER TO HAVE THE CURSOR-FINGER POINTING TO THE BUTTON YOU WANT AND THEN CLICK THE MOUSE ONCE.

EXHIBIT 13

MAJIK FORMATIVE EVALUATION: OBSERVATION PROTOCOL

Student name: _____

Rsrchr. initials: _____ Date & time: _____

Time required to complete program: _____

Section 1: Introduction to Periodical Indexes

Selected?

Strengths/weaknesses:

Reading/understanding:

Navigating:

Graphics:

Practice exercises:

Strategies:

Student comments/suggestions:

Researcher comments/suggestions:

Section 2: Using Periodical Indexes

Selected?

Strengths/weaknesses:

Reading/understanding:

Navigating:

Graphics:

Practice exercises:

Strategies:

Student comments/suggestions:

Researcher comments/suggestions:

Section 3: Using the UMCP Serials List

Selected?

Strengths/weaknesses:

Reading/understanding:

Navigating:

Graphics:

Practice exercises:

Strategies:

Student comments/suggestions:

Researcher comments/suggestions:

Section 4: UMCP Libraries

Selected?

Strengths/weaknesses:

Reading/understanding:

Navigating:

Graphics:

Practice exercises:

Strategies:

Student comments/suggestions:

Researcher comments/suggestions:

SUMMARY:

EXHIBIT 14

SAMPLE DATA ANALYSIS MATRIX

Section	38 min. Non-Mac User [Name] 1	19 min. Mac User [Name] 2	35 min. Non-Mac User [Name] 3
Using Per. Indexes	R: no problem	R: no problem	R: no problem
	N: linear	N: nonlinear used 1 cons* rather than TOC; was able to find way in and out of sections	N: linear
	G: did not remember boldface was an option	G: "good"	G: button-letter problem; unclear how to go about
	PE: no problem, but did not like buttons; wanted the boldface to indicate right answers	PE: "helped to remember terms	PE: best section; reched anwers

R = reading

N = navigation

G = general

PE = practice exercises

* = revision information

MAJIK/1 Report

EXHIBIT 15

SELECTED STUDENTS' SUMMARY COMMENTS

Graphics:

Graphics good within the limits of the Mac.
Graphics were very good and fun; make you pay attention and move more intensely through the module.
Entertaining graphics kept attention.
Cute graphics.
Excellent graphics.
Good graphics.

Text:

Nice, straightforward, easy to understand text.
Text was very good.
Large amount of text but OK.
Information clear.

Practice Exercises:

Very good.
Good; a check on knowledge.
Helpful; good review of principles.
Not hard; reinforcing.
Learned through practice exercises.

Self-Pacing:

Let's you go at your own pace.

Movement:

See anything you want over again, at any time.
Could always go back.
I could go back easily.

REFERENCES

Cottam, K. M., & Dowell, C. V. (1981). A conceptual planning method for developing bibliographic instruction programs. Journal of Academic Librarianship, 7, 223-228.

Dick, W., and Carey, L. (1985). The systematic design of instruction. Glenview, IL: Scott, Foresman.

Gagne, R. M., & Briggs, L. J. (1979). Principles of instructional design (2nd ed.). New York: Holt.

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